EXHIBIT B

DRAFT CLEANUP ACTION PLAN

TIME OIL/HANDY ANDY NO. 8

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1.0 INTRODUCTION

This draft cleanup action plan (CAP) describes the proposed cleanup action for remediation of the petroleum contamination at the Handy Andy No. 8 Site (Site) located in Vancouver, Washington. The CAP was prepared in accordance with Washington State Department of Ecology (Ecology) Model Toxics Control Act (MTCA) regulations [Chapter 173-340 Washington Administrative Code (WAC)], and meets the requirements of Task 9 in Amendment No. 1 of Agreed Order No. DE 93TC-S274. Time Oil Co. and Ecology entered into an Agreed Order with Time Oil Co. on October 22, 1993, and into Amendment No. 1 on March 13, 1995.

This document presents the information specified by MTCA to be included in a CAP (173-340-360(10)). The purposes of this CAP are as follows: (1) to briefly describe the alternatives presented in the Remedial Investigation and Feasibility Study (RI/FS), and (2) to identify the preferred alternatives. The information presented in this CAP is based on observation, evaluations, and analyses developed in the Time Oil Co. document, *Draft Remedial Investigation/Feasibility Study* (AGRA 1999). The draft cleanup action plan includes the following information:

- A description of the Site surface and subsurface conditions and areas of concern (Section 1.0);
- Cleanup levels as defined by applicable or relevant and appropriate requirements (ARARs), points of compliance and remedial action objectives (Section 2.0);
- Summary of alternatives evaluated (Section 3.0);
- Summary of the proposed cleanup actions (Section 4.0);
- Compliance with MTCA threshold requirements (Section 5.0);
- A list of references (Section 6.0).

1.1 Site Description

Handy Andy No. 8 is an operating gasoline station and convenience store located at 3314 NE 44th Street, Vancouver, Washington. Handy Andy No. 8 has been in operation since the mid 1970s and distributed gasoline of different grades, including leaded and unleaded products. Currently, unleaded gasoline products are pumped from three operational tanks that have the total capacity of 30,000 gallons. The sequence of operators and/or owners of the station is as follows:

Mr. Larry Nelson (1974 or l975 to May 1981), Mr. Randy Anderson (May 1981 to November 1981), Time Oil Co. and Mr. Randy Anderson (special purpose agreement, November 1981 to September 1991), and then again, Mr. Randy Anderson (November 1991 to date). Petroleum contamination was discovered at the station in September 1991 during a soil-gas survey and tank decommissioning at the termination of the special purpose agreement between Mr. Anderson and Time Oil Co. Gasoline contamination had impacted soil and groundwater. In April 1993, it was discovered that petroleum-contaminated groundwater had carried contamination off-site for approximately 1800 feet in a southwest direction. The gasoline plume traveled at a depth of 14 feet to 44 feet below ground surface and discharged to the ground surface in seeps in the Burnt Bridge Creek drainage system. The seeps occur at the base of a steep bluff within a lateral distance of approximately 230 feet. Some of the impacted seeps were located adjacent to a residence.

The Site is composed of the station area footprint, the plume, and plume discharge area (seeps). The Site is located approximately three miles northeast of the Columbia River. A plateau extending from the service station area southwest to a bluff area characterizes the topography in the Site vicinity. The land surface slopes downward at approximately a 6% grade between the station and the seep area. The elevation at the service station is 237 feet MSL and drops down to 80 feet MSL at Burnt Bridge Creek. Figure 1 presents a topographic vicinity map of the area and Figure 2 presents a site map with an estimated demarcation of the plume.

Time Oil Co. initiated a series of investigations and interim remedial actions prior to entering into an administrative order with Ecology. Time Oil Co. investigations included a soil-gas survey, monitoring well installations, and soil and groundwater sampling. Time Oil Co. excavated 900 to 1,000 cubic yards of gasoline contaminated soil during tank decommissioning activities in September 1991. The soil was remediated by bioremediation treatment.

An Agreed Order between Ecology and Time Oil Co. was issued by Ecology in October 1993. The Agreed Order required completion of an interim action groundwater recovery and treatment system and documentation of past actions. In 1993, Time Oil Co. installed a treatment system at the distal end of the plume to capture and treat groundwater discharging to seeps. The recovery system captures a majority of the leading edge of the plume. Operation of the treatment system began in February 1994 and continues to date. As of October 31, 1999, the interim action treatment system as required by the Agreed Order, has treated 40,964,262 gallons of petroleum impacted water.

An amendment to the Agreed Order was signed in March 1995 requiring Time Oil Co. to complete a remedial investigation and feasibility study (RI/FS). During the RI/FS stage of the cleanup, additional monitoring wells were installed, cone penetrometer and continuous soil boring surveys were completed, remedial feasibility studies were conducted, and bench-scale contaminant degradation tests were completed. Also, a groundwater capture and attenuation model was developed, and a limited risk evaluation was performed.

1.2 Site Surface and Subsurface

Detailed descriptions of investigations, evaluations, and conclusions that had been completed at the Site are described in the following documents: *Off-site Subsurface Characterization Report* (SEACOR 1993), *Operation and Maintenance Manual, Groundwater Collection and Treatment System* (SEACOR 1994), *Technical Memorandum* (AGRA 1997), and *Remedial Investigation/ Feasibility Study* (AGRA 1999). The locations of the soil borings, monitoring wells, and the groundwater collection and treatment system are shown on Figure 2. Key findings are summarized below:

- Gasoline contamination was discovered in the station area and along a southwesterly bearing path approximately 190 to 230 feet wide by 1,800 feet long where it discharged to seeps located in the Burnt Bridge Creek drainage system.

- The hazardous substances that have been found at the Site in soil, groundwater, and surface water (seeps) include total petroleum hydrocarbons as gasoline, benzene, toluene, ethylbenzene, xylenes, and lead.

- Groundwater flow is primarily to the southwest at an average gradient of 0.03 ft/ft.

- Native subsurface soil is divided into four units, including two water-bearing units (Unit 1 and Unit 3) separated by a low-permeability soil unit (Unit 2) that appears to effectively inhibit the vertical migration of groundwater. All of these units appear to be continuous in the plume area. Youngest to oldest by stratum, the units consist of the following:

Unit 1 The uppermost unit is 24 to 62 feet thick and is composed of an upper silty sand zone and a lower saturated sand zone. The upper unsaturated zone is 8 to 38 feet thick and the lower saturated zone is 4 to 16 feet thick. This is the water table unit.

Unit 2 The second unit was encountered at depths of 24 to 62 feet below ground surface (bgs). It is approximately 3 to 11 feet thick and consists of clayey silt to clay. It is believed to be a continuous aquitard layer beneath Unit 1.

Unit 3 This unit was encountered at depths of 54 to 74 feet. It consists of silty sand to sandy silt approximately 12 to 13 feet thick beneath Unit 2. The unit is saturated.

Unit 4 This unit was encountered at depths of 66 to 85 feet bgs. It is composed of at least 3 to 22 feet (thickness at maximum explored depth) of relatively impermeable silt and clay.

❖ Soil contamination appears to be limited to a smear zone in Unit I that is related to the groundwater level fluctuation of approximately four to eight feet. The plume is approximately 190 feet wide near the station area and becomes slightly wider (230 feet) near the discharge seeps.

❖ The extent of contamination at the Site was determined to be as follows: 1) in unsaturated soil extending from approximately 10 feet bgs to groundwater in the station area, 2) in saturated soil defined by the groundwater plume area and across the groundwater fluctuation of approximately four to eight feet, and 3) dissolved in the groundwater and surface water in the plume. See attached Figure 2 which shows a site plan that outlines the location of the petroleum contaminated plume. The volume of contaminated soil in the unsaturated zone located in the station area is approximately 7,100 cubic yards (9,200 tons) of soil. The estimated volume of contaminated soil in the saturated zone is approximately 108,000 cubic yards (140,000 tons) of soil and the estimated volume of contaminated groundwater in the plume is estimated to 6,527,000 gallons of water.

- ❖ A film of free phase gasoline has been observed in some station area and plume monitoring wells. A film of free phase gasoline has also been observed at the seeps. No measurable free phase product has been recovered to date. Analytical results confirm dissolved phase gasoline has not been detected in Burnt Bridge Creek.

- ❖ Burnt Bridge Creek is specified as a Class A fresh surface water system in Chapter 173-201A "*Water Quality Standards for Surface Waters of the State of Washington.*" Class A water quality is defined as meeting or exceeding all or substantially all uses, including domestic water supply, salmonid migration, fish and wildlife habitat, and recreation.

- ❖ There are no drinking water wells in the plume. There is one domestic irrigation well located within the "footprint' of the plume, producing water from an aquifer below and separated from the impacted shallow aquifer. This well has been sampled, but no contaminants have been detected.

1.3 Areas of Concern

In preparing this CAP, the areas of concern were divided into three categories. Site alternatives were evaluated based on land use and surface topography and are describe as follows (See Figure 2):

(1) The service station area land use is light commercial and slopes slightly to the southeast. Groundwater is encountered at depths of 11 to 36 feet bgs. The majority of accessible petroleum contaminated soil was excavated and treated. Remaining gasoline contamination is in unsaturated soil and groundwater.

(2) Along the plume length land use is commercial and single-family residential. This area rises in elevation to the southwest and then slopes slightly at first to the southwest before becoming steep above Burnt Bridge Creek. Groundwater was encountered at 38 to 47 feet bgs. The majority of contamination appears to be confined to the groundwater.

(3) The distal end of the plume land use is single-family residential, Arnold Park (a recreation area), and Burnt Bridge Creek drainage. This area includes seeps where groundwater discharges to surface. The topography begins at the top of a bluff and breaks steeply into the Burnt Bridge drainage. Groundwater was encountered between 19 to 29 feet bgs at the top of the bluff. Contamination occurs in groundwater and in seeps.

2.0 CLEANUP STANDARDS AND REMEDIAL ACTION OBJECTIVES

Cleanup standards are comprised of cleanup levels and points of compliance. Cleanup levels, points of compliance, and remedial action objectives were developed for the Site in accordance with MTCA regulations.

2.1 Cleanup Levels

Cleanup levels were developed for groundwater, surface water, and soil containing petroleum hydrocarbon constituents and lead that were detected in water and soil samples taken from the Site.

Groundwater cleanup levels for petroleum hydrocarbons were developed based on the highest beneficial use and reasonable maximum exposure expected to occur under both current and future Site use conditions. The highest beneficial use of groundwater at the Site is drinking water. Currently, contaminated groundwater at the Site is not used as a drinking water source. Groundwater cleanup levels are based on MTCA Method A, Method B (Clarc II, 1996), and Federal Maximum Contaminant Levels (MCLs).

Cleanup levels for the surface water were developed based on the highest beneficial use and the reasonable maximum exposure expected to occur currently and in the future. Surface water cleanup levels are based on MTCA Method A, Method B, and MCLs. (See Table I.)

Soil cleanup levels are based on direct human exposure and protection of groundwater and, therefore, the Site requires the most protective cleanup level for petroleum hydrocarbons. Soil cleanup levels are based on the protection of groundwater (Table 1), except for the lead cleanup levels. Lead levels for the Site are based on the natural background concentration level of 17 ppm lead for soil in the Vancouver area. Soil cleanup levels are listed in Table II.

2.2 Points of Compliance

The point of compliance is the location where cleanup levels are to be attained. Points of compliance for the Site were developed for unsaturated and saturated soil, groundwater, and surface water based on protection of human health.

The point of compliance for unsaturated soil is from 10 feet bgs to the seasonal low water table in the station area only (WAC 173-340-740(6)). The point of compliance for saturated soil for the Site is the same as for groundwater. The point of compliance for groundwater is from the apparent point of release (the former UST basin at the Handy Andy No. 8 station) to the outer boundary of the plume (see Figure 3) extending to the point where the plume discharges at the seep area above Burnt Bridge Creek. It includes all groundwater that could be affected by the original contamination from the uppermost elevation of the saturated zone extending vertically to the depth which could potentially be affected by the original contaminant plume (WAC 173-340-720(6)(b). The point of compliance for surface water is at the point of discharge to ground surface as seeps at the distal end of the Site (WAC 173-340-730(6).

2.3 Remedial Action Objectives

Based on the analysis conducted in the feasibility study (FS), the remedial action objectives are established for the Site as follows:

- ❖ Prevent ingestion of or direct contact with affected soil containing petroleum hydrocarbons above cleanup levels within the proposed point of compliance for soil.
- ❖ Prevent ingestion of or direct contact with groundwater containing petroleum hydrocarbons above the cleanup levels within the proposed groundwater point of compliance.
- ❖ Prevent migration of petroleum hydrocarbons that would result in levels that exceed soil and groundwater cleanup levels at or beyond the proposed point of compliance.

- ❖ Recover and/or treat dissolved and free phase petroleum hydrocarbons to the extent practicable.
- ❖ Implement proposed remedial actions to cleanup the contaminated soil, groundwater, and surface water at the points of compliance within a ten (10) year restoration schedule.

3.0 SUMMARY OF ALTERNATIVES EVALUATED

The development and evaluation of cleanup action alternatives is described in detail in the FS. The conclusions of the FS are summarized below. Key considerations that affected the development of cleanup action alternatives for the Site include maintaining the current property use and incorporating the existing groundwater recovery and treatment system into the final cleanup action. These cleanup actions would include institutional controls as necessary.

Fourteen potential remedial action alternatives for soil and for groundwater were identified for evaluation (see Table III). Evaluation was based on MTCA threshold criteria and other requirements as follows: protectiveness of human health and the environment, compliance with cleanup standards and applicable state and federal laws, provision for compliance monitoring, permanence, reasonable restoration time frame, and potential public concerns in keeping with WAC 173-340-360(2,3). Permanence was evaluated based on whether a cleanup action was “permanent to the maximum extent practical” as follows: overall protectiveness, long-term effectiveness, short-term effectiveness, permanence, implementability, cost effectiveness, community concerns, restoration time frame, and public concerns in accordance with WAC 173-340-360(d).

The soil and groundwater remedial alternatives retained for detailed evaluations were compiled based on the three areas of concern and are described below.

3.1 Alternatives Evaluated for the Station Area

Remedial alternatives evaluated for the station area were *in-situ* soil vapor extraction and *in-situ* air sparging with soil vapor extraction.

3.1.1. *<u>In-situ Soil Vapor Extraction</u>*

In-situ soil vapor extraction (SVE) involves installing screened horizontal or vertical vapor extraction wells in the unsaturated zone to transport petroleum vapors to the surface for treatment. A blower is used to apply vacuum and develop regions of low-pressure around each vapor extraction well. Gas flow is induced by advection toward the extraction lines. The gasses are vented to the surface, where they are treated and/or discharged to the atmosphere. The Site is located in a zero tolerance air emissions zone, and SVE emissions will require treatment per Southwest Air Pollution Control Authority (SWAPCA) regulations.

To install an *in-situ* SVE system at the Site would require the retrofitting of three existing monitoring wells to be used as SVE wells, the installation of an additional SVE well(s), and placement of piping below ground surface that would extend from each extraction well to a treatment facility. The treatment facility would house an electrical hookup, blower, and off-gas treatment equipment. The treatment system would be placed west of the service station building on Time Oil Co. property.

Operation and maintenance would require monthly visits to monitor the SVE effluent stream and blower operation. Estimated cost to implement this alternative, assuming four years of operation, would be about $172,400.

3.1.2 *In-situ Air Sparging with Soil Vapor Extraction*

In-situ air sparging employs the use of vertical wells to inject air into the saturated zone. The injected air increases dissolved oxygen (DO) content in the groundwater and induces air movement through the subsurface which promotes volatilization of gasoline compounds and biological degradation of gasoline compounds.

This alternative would require the installation of a minimum of four screened air sparging wells to a depth of 31 and 34 feet, the use of the existing air sparging well, and the installation of a SVE system as described above.

To complete the air sparging/SVE system, a trench would be excavated and piping installed to connect each sparging or SVE well to a remediation equipment compound.

The station area is anticipated to be conducive to *in situ* air sparging and SVE technologies. It is anticipated that the air sparging/SVE system may need to be operated for a period of two to four years. The estimated cost, assuming four years of operation, would be about $210,800.

3.2 Alternatives Evaluated for the Plume

Remedial alternatives evaluated for the plume consist of monitored intrinsic bioremediation, enhanced *in-situ* biological treatment using an oxygen releasing compound, and *in-situ* air sparging with vapor extraction.

3.2.1 *Monitored Intrinsic Bioremediation*

Intrinsic bioremediation, also known as natural attenuation, is defined by the USEPA as: "the biodegradation, dispersion, dilution, sorption, volatilization and/or chemical and biochemical stabilization of contaminants to effectively reduce contaminant toxicity, mobility, or volume to levels that are protective of human health and the environment." Site analytical data and laboratory studies support the occurrence of intrinsic biodegradation in the plume.

This alternative would require installation of one additional monitoring well (three monitoring wells are already in place for this purpose) in the plume. The monitoring wells would be sampled for sulfate, nitrate, total organic carbon (TOC), iron species, nutrients, and gasoline components. Also, field analysis of groundwater would measure pH, DO, oxygen reduction potential (ORP).

The estimated cost to implement this alternative would be approximately $7,200. This cost estimate includes the installation of a 2-inch I.D. monitoring well to 58 feet, and it includes four years of quarterly groundwater monitoring for compounds listed above.

3.2.2 *In-situ Biological Treatment Using an Oxygen Releasing Compound*

This alternative would use an oxygen-releasing chemical such as magnesium oxide in the saturated zone of the plume to enhance biologic degradation of petroleum constituents.

The oxygen-releasing chemical would be introduced from Geoprobe borings along two transects across the plume axis. Geoprobe borings would be placed on approximate 10-foot centers and drilled below the lowest water table depth. Each transect would require approximately 29 Geoprobe borings. One transect would extend across the width of the plume along Northeast St. James Road, and the other along Northeast 42nd Street.

Monitoring would be performed to test for DO and petroleum contaminants at selected wells prior to installation of the oxygen releasing compound in Geoprobe borings. Follow-up monitoring would be performed on a quarterly basis. It is anticipated that remedial actions would not be initiated in the mid-plume area until after remedial actions were under way and progress evaluated in the station area and the distal end of the plume.

The estimated cost to implement this alternative, assuming a one-time application of the oxygen-releasing compound, would be approximately $503,590.

3.2.3 *<u>In-situ Air Sparging with Soil Vapor Extraction (same technology as described in 3.1.2)</u>*:

The installation of *in-situ* air sparging with soil vapor extraction in the plume would require the installation of five air sparging wells. The wells would be installed in the City of Vancouver right of way along Northeast 42nd Street on 60-foot centers. The wells would be installed to the depth of about 56 feet bgs which is to the top of Unit 2 (low permeability unit). This would serve to remediate the plume area down-gradient of the sparging wells through a combination of volatilization and biodegradation. Also, it would act as a cut-off “fence” to treat any petroleum contamination migrating in the plume from an up-gradient source. It would also prevent re-contamination of the area down-gradient of the sparging wells.

SVE would be used in conjunction with air sparging to capture off-gas. The subsurface portion of the SVE system would utilize either horizontal or vertical piping. Piping would go to a subgrade equipment vault housing a sparging compressor, blower system, and necessary electrical equipment. The remediation compound vault would be located near the southwest corner of Northeast 42nd Street and St. James Road. This would require an access agreement with either the City of Vancouver or an adjacent residential property owner.

The length of time the *in-situ* air sparging/SVE system would operate would depend on the migration and cleanup rate of contaminated groundwater from the station area to the sparging "fence" and from the sparging "fence" to the distal end of the plume. It is anticipated that air sparging/SVE system may need to operate for a period of two to four years.

The estimated cost to implement this alternative with four years of operation would be $232,000.

3.3 Alternatives Evaluated for the Distal End of the Plume

Remedial alternatives evaluated for the distal end of the plume consisted of ways to expand the existing groundwater recovery system. The current interim cleanup action captures a majority of the contaminated groundwater plume in a recovery trench. Water is routed to a treatment facility where it is passed through a tray aeration stripper. The off-gases are oxidized and discharged to atmosphere under a SWAPCA air discharge permit. Treated water is discharged to Burnt Bridge Creek under a NPDES permit. Groundwater capture of the entire leading edge of the plume can be completed by the installation of vertical wells, of a horizontal well or of a recovery trench or trenches in the bluff.

3.3.1 *Groundwater Recovery and Treatment Using Vertical Wells*

This alternative would utilize an array of vertical groundwater recovery wells to achieve capture at the distal end of the plume and would act to prevent groundwater discharge at the seeps.

Approximately six vertical recovery wells would be installed on the bluff at the top of the slope above the Burnt Bridge Creek drainage, to the north and northwest of the existing interceptor trench. These wells would extend approximately four feet into the low-permeability unit, to a depth of approximately 38 feet bgs. A four-foot long section of blank casing would be attached to the bottom to act as a sump/silt trap, and the wells would be screened from 24 to 34 feet. Groundwater is encountered at an average depth of approximately 27 feet bgs in the bluff area.

Groundwater would be extracted from the vertical wells using submersible pumps and discharged to an existing 4-inch PVC pipeline to the treatment system. The anticipated flow through this pipeline is approximately 30 gallons per minute (gpm). This water combined with the existing 20-gpm flow from the interceptor trench would be 50 gpm. Some augmentation of the existing treatment system would be needed to handle the increased volume of water. The NPDES discharge permit allows for treatment of this extra volume of water.

The duration of operation of the plume distal end groundwater recovery and treatment system will be contingent upon the success of remedial strategies for the station area of the plume. It is assumed that the treatment system may operate for a period of three to eight years. The estimated cost for this alternative, assuming an eight-year period of operation, would be approximately $428,500.

3.3.2 *Groundwater Recovery and Treatment Using a Horizontal Well*

The primary advantages of using a horizontal well over vertical wells would be: 1) to reduce the impact to the seep area in Arnold Park or residential property at the top of the bluff, and 2) to reduce facility operation and maintenance visits as would be needed with a multiple vertical well recovery system.

One horizontal groundwater recovery well, pump system, and sump would need to be installed and connected to the existing groundwater recovery trench. Because the saturated zone is about seven feet in the distal end area and is underlain by low-permeability clayey silt (Unit 2), the horizontal well would be started at a height of two to three feet above the top of Unit 2 and the well boring would extend up slope while maintaining this height. The proposed horizontal well would be oriented almost directly north, thereby allowing the well to slope down approximately 1 degree to the south. Therefore, the water in the well would gravity drain down to a sump to be installed at the southern end of the well. The well would be installed “blind” (not exiting at the surface).

Drilling of the horizontal well would require the building of a temporary access road west of the existing recovery trench, and of a temporary staging/construction area. A trench and the piping would need to be installed from the horizontal well sump to the existing treatment system.

The total flow from the horizontal well is expected to be about 30 gpm as with the vertical wells. As with the vertical wells, the treatment system, and the existing NPDES discharge permit were designed to accommodate the additional water. Installation of the horizontal well is expected to be technically challenging and very disruptive to the bluff area. The operation and maintenance of the horizontal well is expected to difficult to maintain due to potential for biofouling.

As with the vertical well alternative, duration of operation of the horizontal well recovery system is expected to operate for a period of three to eight years. The estimated cost to implement this system, assuming an eight year period of operation, would be about $405,800.

3.3.3 *Groundwater Recovery and Treatment Using Recovery Trench(es)*

This alternative would utilize additional horizontal groundwater recovery trenches to achieve complete capture of the distal end of the plume and to prevent groundwater discharge to seeps. The proposed trenches would be used in conjunction with the existing groundwater recovery trench. Captured groundwater would increase the flow to the existing treatment system by approximately 30 gpm. As stated above, the existing treatment system and NPDES discharge permit were designed to accommodate the increased load.

Due to the steepness and ruggedness of the terrain in the vicinity of the seeps, it would be more feasible to install a series of short trench sections with associated sumps to each of the affected seep areas than to install a continuous recovery trench along the bluff. Five short trenches and associated sumps would be installed into seep areas west of the existing recovery trench. At each seep, a five- to ten-foot long trench, four-foot deep, would be excavated to extend slightly into the base of the low permeability layer. The trenches would be lined with non-woven geotextile fabric, filled with 1-inch drain rock and covered with an impermeable material. These sumps would be piped to collect water and constructed to gravity drain down slope to one or two central collector sumps. The collected water would be pumped through shallow buried piping to the treatment system.

The duration of operation of the recovery trenches and treatment system will be contingent on the success of remedial strategies for the station area and plume area. It is assumed that this alternative will operate for a period of three to eight years. The estimated cost to implement this alternative for eight years would be about $355,300.

4.0 PROPOSED CLEANUP ACTION

Comparative analysis of alternatives was completed for the Site based on the criteria contained in WAC 173-340-360. These criteria are summarized as follows: protection of human health and the environment, compliance with ARARs, compliance with applicable state and federal laws, provision for compliance monitoring , permanence to the maximum extent practical (overall protectiveness, long-term effectiveness, short-term effectiveness, permanent reduction of toxicity, mobility, and volume of contaminant, ability to be implemented, cost effective, and community concern), restoration time frame and consideration of public concerns. Tables IV, V, and VI present a summary of the comparison analysis for the three areas of concern. An estimate of cost for each alternative is presented in Table VII. The collective cost proposed for the CAP is summarized in Table VIII.

The proposed remedy for the Site is as follows:

- Install *in-situ air* sparging/SVE system in the station area,
- Install vertical extraction wells at the distal end of the plume to transfer the contaminated water to the existing treatment system, and
- Determine performance of these two remedial systems by monitoring bioremediation in the center of the plume, as well as performing compliance monitoring.

5.0 RESTORATION TIME FRAME

The restoration time frame for the soil, groundwater, and surface water at the Site is estimated to be ten (10) years from the date of the Consent Decree. In ten years, cleanup levels are expected to be met at the points of compliance. This time frame is based on the expected effectiveness of the remedial technologies chosen to remediate the Site.

These technologies meet the requirements of two of the top three preferred technologies pursuant to WAC 173-340-360(4): destruction and detoxification as well as volume reduction followed by destruction and detoxification of residual hazardous substances. They will limit risk of exposure to hazardous substances to human health by preventing contact by providing physical barriers yet they maintain current use. They will control hazardous substances from migrating from the Site. *Intrinsic* biodegradation has been studied and proven to occur on the Site. The surrounding community is on a public water system (WAC 173-340-360(6)).

6.0 COMPLIANCE WITH MTCA REQUIREMENTS

MTCA threshold and other requirements are listed above in Section 4.0. The CAP for the Site involves the coordination of three separate cleanup alternatives working together to meet MTCA requirements.

The CAP would provide protection to human health and the environment by removing petroleum contaminates from the Site affected soil, groundwater, and surface water. The air sparging/SVE system in the Station area, intrinsic bioremediation in the mid-plume area and groundwater recovery and treatment at the distal end of the plume would capture and detoxify petroleum contaminates. The treatment facilities would operate until cleanup standards were met for soil and water.

The CAP complies with federal, and state, cleanup standards, and regulations. Subsequent federal, state, or local laws or regulations identified during the implementation phase of the CAP will be added as needed. State and local guidance polices will be applied as they occur during the remedial design phase of the CAP. The following ARARs apply to the Site.

State Laws and Regulations

A. State Environmental Policy Act, Chapter 197-11 WAC
B. Minimum Standards for Construction and Maintenance of Water Well, Chapter 173-160 WAC
C. Water Pollution Control, Chapter 90.48 RCW
D. NPDES permit Program, Chapter 173-220 WAC
E. Water Quality Standards for Surface Waters of the State of Washington, Chapter 173-201A WAC
F. Washington Clean Air Act, Chapter 70.94 RCW
G. Washington Industrial Safety and Health Act (WISHA)

Federal Laws and Regulations

H. Occupational Safety and Health Act (OSHA), 29 Code of Federal Regulations (CFR) subpart 1910.120
I. Federal Water Pollution Control Act of 1972 (Clean Water Act)
J. Water Quality Act of 1987:
    1) Section 308. Establishes water quality criteria for toxic pollutants
    2) Section 402. Establishes the NPDES permit process for discharges to surface water bodies

Compliance monitoring would be provided as specified in WAC 173-340-410. Protection monitoring would be provided to confirm that human health and the environment are adequately protected during construction and operation and maintenance period of the final cleanup action plan. Performance monitoring would be provided to confirm that remedial actions have attained ARARs. Confirmational monitoring would be provided to confirm the long-term effectiveness of the cleanup action once cleanup ARARs have been attained. A Compliance Monitoring Plan would be prepared and submitted to Ecology for approval during the remedial design phase.

The CAP would employ treatment technologies that permanently and significantly reduce toxicity, mobility, and volume of petroleum compounds on Site. The remedial alternatives described in the CAP would further reduce the volume of contaminants by removal and/or degradation of volatile components of gasoline in unsaturated soil and removal and/or degradation of dissolved and free phase product from groundwater. All of these actions would result in reduction of contaminant volume to an extent practicable. Also, natural attenuation of gasoline contaminates occurs at the Site through intrinsic *in-situ* biodegradation.

An estimate of the CAP cost is presented in Table VIII. Although air Sparging with SVE is more costly than SVE alone, it would be more efficient in reducing the toxicity and volume of contaminants in the plume. Vertical wells instead of horizontal wells or recovery trench were chosen for the distal end of the plume even though it is more costly. It is believed that installation of vertical wells would be much less destructive to the environment than either horizontal wells or trenches. Vertical wells would be less destructive to private property and to the plant community on the bluff.

The CAP work will be implemented under a Consent Decree with Time Oil Co. The implementation schedule per the CAP will be included as Scope of Work attached to the Consent Decree.

7.0 PUBLIC CONCERNS

Public concerns will be evaluated based on any comments received during the forthcoming public comment period. The public participation plan will be included in the Consent Decree.

8.0 REFERENCES

AGRA, Earth and Environmental, 1999. *Remedial Investigation/Feasibility Study, Time Oil Co. Handy Andy #8 Site.* Pp. 109.

AGRA, Earth and Environmental, 1997. *Technical Memorandum, Time Oil Co. Handy Andy #8.* Pp. 42.

The Model Toxics Control Act Cleanup Regulation, Chapter 173-340 WAC, Toxics Cleanup Program, (amended January 1996), Pub. No. 94-06. Pp. 95.